

author, as Dean of the Evening-class Lectures at King's College, London, delivered before the Principal, the staff, and students, at the commencement of this Winter Session.

It deals with the antiquities of coal, and as might have been anticipated, shows much patient scholarship and research amongst the works of those classical and mediæval writers who are not usually troubled by geologists. Prof. Wiltshire considers that there is evidence to show that ignition of coal, which had been selected as hut-making material with the help of palæolithic and neolithic implements, occurred and probably accidentally; the mineral not having been selected for its now well-known qualities. Nevertheless, he admits that "the general non-employment of the coals and lignites, in the stone and bronze ages, is well evidenced by the absence of allusion to their use, both in myths and traditions of that date and in the manuscripts which followed not long after." Noticing the silence of Homer on the use of coal, the author very properly places the Levitical coals and those of the Gospels amongst charcoals derived from wood, and he shows that the "carbo" of Pliny and the "anthrax" of Theophrastes were identical. Searching over the dreary pages of this last-named author, Prof. Wiltshire shows that this Greek first noticed and recorded that certain stones were obtained from the ground, and that, broken in pieces, they burn like anthrax (charcoal), and that they come from Liguria and Elis.

The tertiary strata in those localities are lignitic, and true palæozoic coal does not exist there. As years rolled on many coal-like minerals were used, and fancies envired them. Certain it is that during the Roman occupation of Britain, coal was stored and used, for it has been found beneath the ruins of villas in Warwick, Shropshire, Yorkshire, Lancashire, and Durham. The gradual extinction of the Romano-British was followed by hundreds of years of forgetfulness of coal, and then we find the Abbot of Peterborough leasing ground, a part of the rent to be paid in coal, about the time of Alfred. About 1190 the Edinboro' coal-field began to be used, and in 1239 a monopoly of the sale of coal was granted to the Newcastle people.

This interesting lecture is most readable, and well worthy of the accomplished editor of the Palæontographical Society's volumes. P. M. D.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

Quarantine in Italy

ALLOW me to say a few words in defence of the prohibitive measures taken by the Italian Government against the introduction into our country of that pest, the phylloxera, and which, though subjected to much unreasonable criticism and selfish opposition here and abroad, have at least been hitherto perfectly successful in protecting our vineyards. Certainly at first sight it would seem that the only necessary measure to be taken ought to be a restriction on the importation of foreign vines, and of the plants (such as fruit-trees) usually cultivated along with them in nursery-grounds, and on whose roots some stray insects might probably occur; and to such a restriction did the Government at first limit itself. But it was soon found out to be quite ineffectual, as it only gave occasion to smuggling on a grand scale, encouraged, I am sorry to say, by certain horticultural firms that did not fear to compromise their respectability by so doing. We all know what ingenious persons smugglers can be; they began introducing the prohibited plants in their leafless state labelled as choicest exotics, to the utter confusion of the

Custom House officials, who, being neither naturalists nor scientific men to any degree, were at a loss how to act, until the Government was obliged at last to send the order that no live plant should pass the frontier; a simple rule that anybody can understand, and not to be regretted when one has seen in France and elsewhere thousands of acres of what were once flourishing vineyards blasted by the pest, and has heard of the millions of money lost that way. I shall not mention such petty annoyances as being obliged to leave a bouquet at the Custom House; but surely it is better that our gardens should be deprived of those novelties and rarities that are not obtainable through seeds, rather than run the slightest risk of diminishing one of the principal resources of our impoverished country. Though myself a director of a botanic garden, I own I cannot push my love for flowers to that extent to sacrifice to it much greater interests.

Pisa, February 26

T. CARUEL

Captain Cook's Accuracy

Apropos of your article on the centenary of Capt. Cook's death in NATURE, vol. xix. p. 334, it may be interesting to call attention to his remarkable accuracy in determining the positions of places laid down in his charts. There is a great contrast between his accuracy and the evident carelessness of some more recent navigators. Some years ago when I was sailing in the Pacific we were one day approaching the recorded position of an island which no one on board our vessel had seen. I was conversing with the captain, and asked him whether he expected to find it in its recorded place. To this he replied: "It is sure to be there, for Capt. Cook determined its position; and although I have been now a good many years in the Pacific, I have never yet found him wrong. Had it been the United States Exploring Expedition which determined its place, I should have thought the chances just about equal as to whether it is right or wrong."

There is, unfortunately, too much ground for the remark about the observations of Admiral Wilkes's Expedition. Those who have had opportunities to test the work done by it know that it is often most inaccurate. Quantity of work rather than the quality of it appears to have been the rule with the navigators who conducted that expedition. I believe all Cook's work was worthy of his reputation.

As this is a serious charge to make against such an expedition, it may be well to give some examples to substantiate it. The particulars of the first I take from Findlay's "South Pacific Directory," pp. 633-34. Respecting Vatoa, or Turtle Island, south-east part of the Fiji Archipelago, he says: "A singular mistake crept into the survey by the United States' Expedition. On May 5, 1840, the *Vincennes* had a sight of Turtle Island, and determined it to be in lat. $19^{\circ} 48'$ S., long. $178^{\circ} 33'$ W. It has the appearance of a small rounded knoll." This would seem to be circumstantial, and is further confirmed by a footnote on the same page. In a subsequent passage the *Porpoise* is said to have determined it to be in lat. $10^{\circ} 50'$ S., long. $178^{\circ} 37' 45''$ W. "It was found to be three miles long, by one and a quarter mile wide. The reef extends all around the island, and is from one and a half to two miles wide."

If we suppose that in the above 10° is a misprint for 19° there will be only $2'$ in lat. and $4' 45''$ in long. difference between the two determinations. But it appears that both of these are about $30'$ in error in their longitude. On this Findlay remarks: "This singular variation in longitude from that assigned to it by the great discoverer Cook ($178^{\circ} 0'$ W.), or $37'$ in error, is startling, because the accuracy of Cook in this instance had been confirmed by other navigators." He then gives an account of an examination of it made by Capt. Worth in H.M.S. *Calypto* in 1848, when he made the island to be "apparently about six miles in length," its centre twenty-nine miles eastward of Wilkes's position, and, instead of the reef from one and a half to two miles wide all around, on the south-west a reef five or six miles wide, with "a large oval coral patch detached from it lying north and south, eight or nine miles in length."

My second example of inaccuracy shall be one in cartography. Some years ago I was about to make a trip into the mountains of Savaii, the largest of the Samoa Islands. Before starting, with Wilkes's chart in my hand, I took a few bearings of points which might serve for comparison when I reached the mountains. I was standing at Tuasivi, a place on the eastern end of the island which may be seen marked in Grundemann's map. To my surprise I found I could see from that place to Tafua point, the south-east extremity of the island, whereas the chart made

the land to project very considerably between the two points. On further examination, I found that, instead of making the land trend inward to a very deep bay at Sapapali'i and Iva, as it does in reality, it had been made to extend seaward in a series of headlands. This error is perpetuated in all the maps I have seen, including Grundemann's, and that published in the *Journal des Muséum Godeffroy*, both of which are based on Wilkes's chart.

My third and last example shall be one of a different kind. In 1870 I visited an island north of Samoa known as Quiros or Gente Hermosa. Wilkes' expedition described it as being *with-out a lagoon*. I found it to be barely four miles in diameter, but with a *deep fresh-water lagoon in its centre about three miles in diameter*. Now as the ring of land around this lagoon is only about one-third of a mile across, I cannot imagine how any members of the expedition could have landed without seeing the water. Such an inaccuracy as this would have been bad enough in the description of an ordinary traveller. It is inexcusable in an expedition specially fitted out for scientific observation.

S. J. WHITMEE

Cook's Collections

IN NATURE, vol. xix. p. 373, a remark of Dr. Hamy, of Paris, is reproduced, concerning "the fate of Cook's collections in being buried in an Austrian museum." It will be of general interest to make known that, what there is in Vienna of ethnographical objects in relation to Cook, consists of 260 numbers, chiefly originating from Cook's third voyage. These objects were bought by order of the Emperor Franz in the year 1806, at the auction of the Parkinson Museum in London (previously Lever Museum), and now form part of the large ethnographical collections, which will be accessible to the public in a few years in the new, nearly completed, Imperial Natural History Museum of Vienna. This museum will become one of the greatest and most complete on the continent, uniting all mineralogical, geological, palaeontological, prehistoric, anthropological, ethnographical, zoological, and botanical imperial collections of Vienna under the charge of Prof. Hochstetter.

A. B. MEYER

Royal Zoological Museum, Dresden, February 28

Magnetic Storm, May 14, 1878

THERE appears to have been a slight error in my note (vol. xix. p. 148); in the sixth line, it should read 14th instead of 15th.

With this exception the observations are correctly reported, and the period during which the greatest trouble was experienced in working on the Persian Gulf cable covers the time at which the magnetic storm was observed at Stonyhurst to be at its height (vol. xviii. p. 617).

I cannot quite agree with Mr. Preece when he suggests (vol. xix. p. 173) the advisability of recording earth-currents in Webers. Comparatively few of the readers of NATURE would appreciate the magnitude of an earth-current if expressed in those terms, while every one, I think, will understand me when I say that the earth-current passing through the line equalled that which would be produced by a certain number of cells connected to the same circuit.

The systematic observation of earth-currents in different parts of the world is no doubt very desirable, but to be of value it must be regulated and collated by some central authority. I feel convinced that if the Society of Telegraph Engineers invited assistance in this matter, and pointed out what was actually required, the appeal would be very readily responded to.

Kurrachee, February 6

HENRY C. MANCE

Intellect in Brutes

IF Mr. Henslow will read my letter again he will find it distinctly stated that the "several occasions" on which the leakage took place were referred to in connection with the agency of rats only. The plumber informs me that in none of the cases (four or five) was there any sign of injury to the pipe by frost. In the specimen which I have, the rats have made two *ineffectual* attempts to perforate the lead, and have succeeded in two distinct places. Had a frost crack existed, with consequent escape of water, there would have been no necessity to make two fruitless attacks on the pipe elsewhere. The specimen may be seen by any one interested at the office of *The Country*, 170, Strand. Metaphysicians will probably think that Mr. Henslow has

stumbled into a quagmire in his discussion of "practical" and "abstract" reasoning. Does he believe that brutes and boys in common have nothing but the faculty of "practical" reason? When a boy finds the value of x in a simple equation, is he not dealing with "abstract" ideas? ARTHUR NICOLS

I AM not opposed to Dr. Darwin's teachings, nor do I care much whether science proves that man is descended from Adam or from some extra clever race of monkeys, so long as the *truth* is established. In regard to the explanation given at p. 365 of the rats eating the pipe to get at the water because they "heard the water trickling," I am inclined to look at the matter in a simple matter-of-fact way, and so feel inclined to think they cut the pipe because it was somehow in their way. Lead and block-tin gas-pipes are found cut in a similar way. Now, are they cut to get at the *gas*? Lead waste-pipes are also often found so cut, both from the outside and inside. I happen to be a practical plumber myself, and have had to deal with rats in many ways, but I scarcely think that "the reasoning power of the rat" in this case has been properly reasoned out.

21, Renfrew Street, Glasgow, March 1 W. P. BUCHAN

I BELIEVE "that the reasoning faculty in man and animals differs in degree only." But I do not think Mr. Nicols' plumber's lead-pipe case (NATURE, vol. xix. p. 365) a well-tested instance of rat sagacity. We have not sufficient proof that the rats gnawed the pipe for the purpose of getting at the water; though, of course, they used the water after having come upon it. It seems more likely that they gnawed the pipe because it obstructed their tunnelling operations; else why did they cut it in two separate places? Mr. Nicols says "a rat will not drink foul water." Neither will I when I can get better, but I am afraid I should need to put up with the foul if I lived in a sewer.

Cambuslang

HENRY MUTRHEAD

It is somewhat difficult to understand Mr. Henslow's remarks on the above subject in NATURE, vol. xix. p. 385. He tells us that if the dog that rang the bell to fetch the servant to let him out of a room in which he was shut up, *had not been taught to ring the bell*, "it would have been *abstract reasoning*, but it was only practical." Further on he says that brutes never acquire "abstract reasoning."

The Arctic fox, by Mr. Henslow's own showing, appears to have used "abstract reasoning," because it had never been taught to cut the line attaching the bait to the trigger of the gun before taking the bait (of which I have seen several cases), or to dig a trench in the snow to avoid the shot. Can Mr. Henslow be a sportsman? If so, he ought to know that in the case referred to, to pull the bait downwards *out of the line of fire* was the only safe way for the fox to have acted, so as to get his head out of danger. Had he used what Mr. Henslow calls "abstract reasoning"—which, I presume, means pulling the bait, not the line, to *one side* out of the line of fire, the fox would certainly have been shot, as the bait could not have been moved more than four or five inches from the wooden stake through which the bait-line passes.

If Mr. Henslow really means that the fox should have shown his powers of "abstract reasoning" by going up to the line of fire between the gun and the bait, and then pulled the string until the gun went off, I think the chances of reynard's ever eating the bait would be very small indeed. I have known him do what showed equal or greater intelligence, namely, cut the bait-string, as already mentioned.

Royal Institution, February 28

JOHN RAE

MR. HENSLow, in his letter on this subject, complains that "brute reasoning is always *practical*, but never *abstract*." As an instance of what appears to me abstract reasoning in a dog, I beg to offer the following: A few years ago we had in our possession a terrier gifted with a propensity (probably instructive) for worrying the sheep that were put to graze in a field separated from our house by another field. Coming out of the house one day I observed this dog crossing the latter field, evidently intent upon a little amusement. I called him back, he obeyed; but when he came to a patch of brushwood which hid him from view, he cut straight across the field, under cover of the brushwood, to behind a hedge, and then pursued his course